DECLARATION

I, Mayumi Takano, of Yanagida & Associates, 7F Shin-Yokohama KS Bldg., 3-18-3 Shin-Yokohama, Kohoku-ku, Yokohama-shi, Japan, hereby certify that I understand both English and Japanese, that the translation is true and correct, and that all statements are being made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

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[Name of Document] SPECIFICATION

[Title of Invention] Holder for magnetic transfer device

[Scope of Demand for Patent]

1. A holder for a magnetic transfer device, comprising:

a first holder portion and a second holder portion which are movable toward and away from each other and between which there is formed an interior space where a master carrier with information is held in intimate contact with a slave medium, to which the information borne by the master carrier is transferred;

wherein at least one of said first and second holder portions has an interior pressing surface provided with an elastic member having elastic characteristics; and

wherein said elastic member has a deformation quantity of 5 to 500 μm in a pressure-applied direction when pressure is applied.

2. The holder for a magnetic transfer device as set forth in claim 1, wherein said elastic member has an elastic modulus of 5 to 200 MPa.

3. The holder for a magnetic transfer device as set forth in claim 1, wherein said elastic member has a press portion whose thickness fluctuation is 100 μm or less.

4. The holder for a magnetic transfer device as set forth in claim 1, wherein said elastic member has suction apertures.

[Detailed Description of the Invention]

[0001]

[Technical Field of the Invention]

The present invention relates to a holder for a magnetic transfer device that magnetically transfers information carried by a master carrier to a slave medium, and more particularly to such a holder for enclosing the master carrier and the slave medium in its interior space and bringing the master carrier into intimate contact with the slave medium.

[0002]

[Description of the Related Art]

In magnetic transfer, a master carrier (patterned master) has at least a magnetic layer in which information such as servo signals is formed as a "land/groove" pattern or embedded structure, and is brought into intimate contact with a slave medium having a magnetic recording portion to which the information borne by the master carrier is transferred. By applying a transfer field, a magnetization pattern corresponding to the information borne by the master

carrier is transferred and recorded on the magnetic recording portion of the slave medium. Such a magnetic transfer method is disclosed, for example, in Japanese Unexamined Patent Publication Nos. 63(1988)-183623, 10(1998)-40544, 10(1998)-269566 and 2001-256644, etc.

[0003]

In the case where the above-described slave medium is a discoid medium, such as a hard disk or high-density flexible disk, one or two master carriers of discoid shape are brought into intimate contact with one side or both sides of the slave medium, and a transfer field is applied by a magnetic field application device, arranged on one side or both sides, which consists of electromagnets or permanent magnets.

[0004]

To enhance transfer quality in magnetic transfer, it is vital to contact the master carrier and the slave medium uniformly. If they are imperfectly contacted, an area will occur in which no magnetic transfer is performed. If no magnetic transfer is performed, a signal dropout error will occur in magnetic information transferred to the slave medium and signal quantity will be degraded. In the case where recorded signals are servo signals, the tracking function cannot be sufficiently obtained and therefore reliability will

be degraded. It is also extremely important that there be no dust particles on the intimate contact surface between the master carrier and the slave medium. If dust particles adhere to the intimate contact surface, intimate contact between the master carrier and the slave medium cannot be assured in an area around a dust adhering portion, so a signal dropout error will occur and signal quality will be degraded.

[0005]

[Problems to be solved by the Invention]

In accordance with the above-described magnetic transfer, a first holder portion and a second holder portion which are movable toward and away from each other and between which there is formed an interior space where a master carrier is held in intimate contact with a slave medium. It has been proposed that, in order to contact the master carrier and the slave medium over the entire surfaces thereof, an interior pressing surface of the holder is provided with an elastic member and the reverse side of the master carrier or the slave medium is pressed through the elastic member and intimate contact force is applied uniformly to the intimate contact surface between the master carrier and the slave medium by the elastic member so as to improve contact.

[0006]

However, since the elastic member in the above-described holder for a magnetic transfer device uses extremely soft materials such as urethane foam, there are cases where at the time of intimate contact between the master carrier and the slave medium, the master carrier will move in the planar direction and therefore accuracy of alignment will be degraded.

[0007]

That is, in a double-sided simultaneous transfer or single-sided transfer method (in which with respect to an elastic member installed on the interior surface of a holder portion, a master carrier is precisely positioned and held at a reference position by an image processing method, and the master carrier is brought into intimate contact with a slave medium positioned and held on another holder portion by moving the two holder portions toward each other), the extremely soft elastic member will be greatly deformed when pressure is applied, the center position of the master carrier will be shifted by the components of the deformation parallel to the intimate contact surface, the center position of the master carrier with respect to the slave medium will change, and the positional accuracy of signals recorded on the slave medium will be degraded. For instance, an allowable core shift quantity for servo signals is typically 50 to 100 μm. Therefore, if a

positional shift occurs beyond this quantity, there are cases where a desired tracking function cannot be obtained.

[0008]

To prevent the above-described positional shift, there is a means to use a positioning member which holds the inside diameter or outside diameter of the master carrier, but since the elastic member has a great compressive deformation when pressure is applied, the master carrier will move axially according to applied pressureand rubbing will occur between the positioning member and the master carrier. Because of this, there are cases where the life of the master carrier will be shortened due to wear, or worn particles will adhere to an intimate contact surface and degrade the quality of transferred signals.

[0009]

Also, in the case of a single-sided transfer method (in which with respect to a master carrier installed on the interior surface of one holder portion, a slave medium is precisely positioned and held by an image processing method, and the reverse side of the slave medium is pressed and brought into intimate contact with the master carrier by an elastic member installed on the interior surface of another holder portion), the extremely soft elastic member will be greatly deformed when

pressure is applied, the slave medium will be shifted in the planar direction, the center position of the slave medium with respect to the master carrier will change, and the positional accuracy of signals transferred and recorded to the slave medium will be degraded.

[0010]

The present invention has been made in view of the above-described problems. Hence, it is a primary object of the present invention to provide a holder for a magnetic transfer device which is capable of enhancing intimate contact between a master carrier and a slave medium through an elastic member and enhancing the quality of transferred signals, while preventing positional shift and the occurrence of dust particles, and enhancing the durability of the master carrier.

[0011]

[Means used to solve the Problems]

The holder for a magnetic transfer device of the present invention comprises a first holder portion and a second holder portion, which are movable toward and away from each other. Between the first and second holder portions, there is formed an interior space where a master carrier with information is held in intimate contact with a slave medium, to which the information borne by the master carrier is transferred. At

least one of the first and second holder portions has a pressing interior surface, which is provided with an elastic member having elastic characteristics. The elastic member has a deformation quantity of 5 to 500 μm in a pressure-applied direction when pressure is applied.

[0012]

In the holder of the present invention, it is preferable that the aforementioned elastic member have an elastic modulus (Young's modulus) of 5 to 200 MPa. It is desirable that the aforementioned elastic member have a press portion whose thickness fluctuation is 100 μm or less. Also, the aforementioned elastic member may have suction apertures.

[0013]

It is preferable that the optimum deformation quantity of the aforementioned elastic member be greater than or equal to the total of the flatness of the interior surface of one holder portion which holds the elastic member and the flatness of the interior surface of the other holder portion. Also, the optimum elastic modulus of the elastic member is determined by primary factors such as the thickness of an elastic material to be used, a fluctuation in the thickness, precision in manufacturing the holder, pressure applied at the time of magnetic transfer, etc.

[0014]

The material of the elastic member can use an elastic material such as urethane rubber, nitrile butadiene rubber (NBR), etc. If the elastic material is impregnated with fluorine, etc., its surface friction coefficient becomes smaller and therefore the occurrence of dust particles can be further suppressed. The elastic member is formed into a desired shape by injection molding, water jet molding, cold molding, etc.

[0015]

The expression "when pressure is applied" is intended to mean "when an intimate-contact force is applied between the master carrier and the slave medium to bring them into intimate contact with each other," and mean "the state in which at least a transfer field is applied." The intimate-contact force is applied by a method of applying pressure mechanically, a method of applying pressure by pumping air out of the interior of the holder, a combination of both, etc. The "deformation quantity" is the quantity that the thickness of the elastic member changes before and after the application of pressure. To obtain the same deformation quantity, a thick elastic member has a high elastic modulus, and a thin elastic member has an elastic modulus lower than that. The deformation quantity is set in a range of 5 to 500 μm regardless

of the thickness of an elastic member.

[0016]

On the other hand, the positioning of the master carrier with respect to the holder can be performed by a method of aligning two positioning marks by processing images photographed by a CCD, etc., or a method of aligning two positioning marks by a positioning member.

[0017]

There are cases where double-sided simultaneous transfer is performed with master carriers contacted intimately to both sides of a slave medium, and cases where single-sided transfer is performed with a master carrier contacted intimately to one side of a slave medium and, as occasion demands, double-sided serial transfer is performed. The elastic member is installed on either or both of the opposite pressing interior surfaces of the holder. In double-sided transfer, satisfactory results were obtained by installing the elastic member on both sides when satisfactory results were not obtained by installing it on one side. In single-sided transfer, satisfactory results were obtained by installing the elastic member on one side. Also, in the case of double-sided simultaneous transfer, the elastic member is equipped with suction apertures to hold one or both master carriers, and it is preferable to suction hold

the reverse side of the master carrier through the suction apertures. When the master carrier is suction held, the elastic member may also be suction held simultaneously by the holder. The elastic member may be fixedly attached to the holder by adhesion, etc. Also, the master carrier may be fixedly attached to the elastic member by adhesion, etc.

[0018]

[Advantageous Effects of the Invention]

According to the present invention, at least one of the first and second holder portions has a pressing interior surface, which is provided with an elastic member that applies an intimate-contact force to a master carrier and a slave medium. The elastic member has a deformation quantity of 5 to 500 μ m in a pressure-applied direction when pressure is applied. Therefore, deformation of the elastic member makes it possible to intimately contact the master carrier and the slave medium uniformly over the entire surfaces thereof. Moreover, the deformation quantity is as small as 500 μm and the movement of the master carrier or slave medium in the planar direction is small, so the positioning of both can be maintained with a high degree of accuracy, and the quality of transferred signals and positional precision are satisfactory. Thus, the occurrence of dust particles and reduction in the durability

of the master carrier due to the rubbing of the positioning members can be suppressed.

[0019]

In addition, by suppressing the positional shift in the planar direction, magnetic transfer in a state that the center axis of the slave medium and the center axis of the pattern of the master carrier are matched at high accuracy becomes possible. That is, when pressure is applied after the holder and the master carrier, or the master carrier and the slave medium, are accurately positioned by image processing means, etc., degradation of accuracy of alignment and positional accuracy of transferred signals can be prevented, if the master carrier or slave medium moves greatly in the planar direction because of deformation of the elastic member.

[0020]

Furthermore, when pressure is applied, the deformation quantity of the elastic member is small, and in the case of using a positioning member, the occurrence of dust particles due to rubbing is small. Therefore, the degradation of the quality of transferred signals can be suppressed and a reduction in the wear on the master carrier can enhance durability thereof.

[0021]

[Description of the Preferred Embodiment]

Embodiments of the present invention will be described in detail below with reference to the attached drawings. Referring to Fig. 1, there is a schematic sectional view showing the open state of a holder for a magnetic transfer device constructed in accordance with a first embodiment of the present invention. Each figure is a view showing a frame format and, for facilitating the understanding of the present invention, the dimensions of each part are shown at ratios differing from those of the actual dimensions.

[0022]

In the holder 10 of a magnetic transfer device illustrated in Fig. 1, magnetic transfer is simultaneously performed on both sides of a slave medium. The holder 10 is equipped with a left-side holder portion 5 and a right-side holder portion 6, which are movable toward and away from each other. Within an interior space that is hermetically sealed by a seal cover 7 at the outer periphery when the left-side and right-side holder portions 5, 6 are moved toward each other, a slave medium 2 and opposite master carriers 3, 4 are arranged, and with the centers aligned with one another, the slave medium 2 and master carriers 3, 4 are held in intimate contact with one another. The expression "intimate contact" is intended to mean that they are in direct contact with one another, or that they are in close

proximity to one another with an extremely slight gap.

[0023]

The interior pressing surface (reference surface) 5a of the left-side holder portion 5 holds both the left-side master carrier 3, which transfers information such as servo signals to one side of the slave medium 2, and the slave medium 2. On the other hand, the interior pressing surface 6a of the right-side holder portion 6 is provided with an elastic member 8, which is in the form of a sheet and constructed of an elastic material. The elastic member 8 holds the right-side master carrier 4 that transfers information such as servo signals to the other side of the slave medium 2.

[0024]

The left-side holder portion 5 is in the form of a disc, and the central portion of the circular interior pressing surface 5a, which is greater than the outside diameter of the left-side master carrier 3, has suction apertures 5b in a range corresponding to the size of the left-side master carrier 3. The suction apertures 5b communicate with an air passageway 5c, which is formed within the left-side holder portion 5. The air passageway 5c is connected to a vacuum pump (not shown) provided outside the holder portion through a support shaft 5d so that the left surface of the left-side master carrier 3 can be held

by suction through the introduction of suction pressure.

[0025]

On the other hand, the right-side holder portion 6 is also in the form of a disc, and the interior pressing surface 6a greater than the outside diameter of the right-side master carrier 4 has a recess, which has a depth equal to the thickness of the elastic member 8. The recess is provided with a great number of suction apertures 6b. The suction apertures 6b communicate with an air passageway 6c, which is formed within the right-side holder portion 6. The air passageway 6c is connected to a vacuum pump (not shown) provided outside the holder portion through a support shaft 6d. The elastic member 8 is provided with suction apertures 8a communicating with some of the suction apertures 6b of the aforementioned interior pressing surface 6a and thus, air suction is performed. With this arrangement, the elastic member 8 is suction held to the interior surface 6a of the right-side holder portion 6 by part of vacuum pressure introduced into the air passageway 6c, and the right-side master carrier 4 is suction held to the surface of the elastic member 8 by the remaining vacuum pressure through the suction apertures 8a formed in the elastic member 8.

[0026]

When the elastic member 8 is mounted on the right-side

holder portion 6, the elastic member 8 may be fixedly attached to the interior surface 6a by an adhesive instead of being suction held. Similarly, the right-side master carrier 4 may be held to the elastic member 8 by an adhesive. In this case, the formation of the apertures 8a into the elastic member 8 becomes unnecessary.

[0027]

The seal cover 7 installed on the outer periphery of the right-side holder portion 6 is in the form of a ring, is mounted on a flange 6e protruding from the outer peripheral surface of the right-side holder portion 6, and is movable in the axial direction (toward and away from the left-side holder portion 5) via an elastic member 7a by the amount that the elastic member 7a is deformed. The end surface of the seal cover 7 is equipped with an end-surface seal member 7b, which consists of an O-ring and is pressed against the interior surface 5a of the left-side holder portion 5 to seal the interior space hermetically. Also, the inner peripheral surface of the seal cover 7 is equipped with a peripheral-surface seal member 7c, which consists of an O-ring and is pressed against the outer peripheral surface of the right-side holder portion 6 to seal the interior space in a sliding manner.

[0028]

The left-side support shaft 5d and right-side support shaft 6d protrude from the centers of the back surfaces of the left-side holder portion 5 and right-side holder portion 6 and are supported by the main body (not shown) of the magnetic transfer device. The left-side holder portion 5 and right-side holder portion 6 are connected to a drive mechanism (not shown) so that they are integrally rotated on the support shafts 5d, 6d at the time of magnetic transfer.

[0029]

Although not shown, the magnetic transfer device is equipped with vacuum suction means for causing the interior space to be in a pressure-reduced state to obtain an intimate-contact force by vacuum suctioning the interior space within the holder 10, and a magnetic field application device for applying a transfer field while rotating the holder 10.

[0030]

The above-described vacuum suction means maintains the interior space of the holder 10 at a predetermined degree of vacuum so that a predetermined intimate-contact force is obtained between the slave medium 2 and master carriers 3, 4. The vacuum suction means also pumps air out of the contact surfaces between them, whereby intimate contact is enhanced.

[0031]

To apply the intimate-contact force, in addition to the vacuum suction means or instead of it, the magnetic transfer device may further be equipped with press means that applies pressure on both sides of the holder 10 mechanically. The press means may be equipped with a pressure cylinder, which has a press rod to apply a predetermined press load to the support shaft 5d or 6d of the holder 10.

[0032]

At least one of the holder portions 5, 6 is movably supported in the axial direction (i.e., the right-left direction in Fig. 1) so they can move toward and away from each other. For instance, if the holder portions 5, 6 are moved from the position shown in Fig. 1 to a position where they are held in intimate contact with each other, the end-surface seal member 7b of the seal cover 7 is pressed against the interior surface 5a of the left-side holder portion 5, and the interior space is hermetically sealed. After it is hermetically sealed, the interior space is decompressed by the vacuum suction means, and the right-side holder portion 6 is further pressed. This deforms the elastic member 8 and brings the master carriers 3, 4 into intimate contact with both sides of the slave medium 2 at a predetermined pressure.

[0033]

The material, thickness, etc., of the elastic member 8 are determined so that when pressure is applied, the deformation quantity of the elastic member 8 in the pressure-applied direction is in a range of 5 to 500 μm.

[0034]

The elastic member 8 is used to apply pressure equally, so it is formed into a discoid sheet from an elastic material. The elastic material can use urethane rubber, nitrile butadiene rubber (NBR), etc. If the elastic material is impregnated with fluorine, etc., its surface friction coefficient becomes smaller and therefore the occurrence of dust particles can be further suppressed. The elastic member 8 is formed into a desired shape by injection molding, water jet molding, cold molding, etc.

[0035]

The elastic modulus (Young's modulus) of the elastic member 8 is 5 to 200 MPa. A fluctuation in the thickness of that portion of the elastic member 8 which presses the right-side master carrier 4 against the slave medium is 100 μm or less. That is, the thickness of that portion of the elastic member 8 is formed uniformly so a difference between a thick portion and a thin portion is 100 μm or less.

[0036]

The optimum deformation quantity of the elastic member 8 is set so that it is greater than or equal to the total of the flatness of the interior surface 6a of the right-side holder portion 6 which holds the elastic member 8 and the flatness of the interior surface 5a of the left-side holder portion 5. The optimum elastic modulus of the elastic member 8 corresponds to the above-described deformation quantity and is determined by primary factors such as the thickness of an elastic material to be used, a fluctuation in the thickness, precision in manufacturing the holder 1, pressure applied at the time of magnetic transfer, etc.

[0037]

On the other hand, the positioning of the master carriers 3, 4 with respect to the left-side holder portion 5 and right-side holder portion 6 can be performed by a method of aligning two positioning marks by processing images photographed by a CCD, etc., or a method of aligning two positioning marks by a positioning member.

[0038]

Note that in addition to the elastic member 8 provided in the right-side holder portion 6, another elastic member may be provided in the interior surface 5a of the left-side holder portion 5. These elastic members are provided according to the

thickness, rigidity, etc., of the slave medium 2 and master carriers 3, 4 in order to obtain higher intimate contact between the master carriers 3, 4 and the slave medium 2. Therefore, there are cases where only a single elastic member is required and cases where installing two elastic members on both sides is preferred. In the case of installing two elastic members to hold the master carriers 3, 4, the elastic members need to have suction apertures, respectively.

[0039]

The slave medium 2 is constructed of a magnetic storage disk, such as a hard disk, a high-density flexible disk, etc., which has one or two magnetic recording portions (magnetic layers) on one side or both sides. The magnetic recording portion is constructed of a coat-type magnetic recording layer or metal thin film type magnetic recording layer.

[0040]

The master carriers 3, 4 are formed as disks. The substrates of the master carriers 3, 4 have a microscopic land/groove pattern coated with a magnetic substance, and these inner surfaces of the master carriers 3, 4 are information carrying surfaces, having a transfer pattern, which are brought into intimate contact with both sides of the slave medium 2. On the other hand, the outer surfaces of the master carriers

3, 4 are suction held by the holder portions 5, 6. Materials for the substrates of the master carriers 3, 4 are nickel (Ni), silicon (Si), quartz, glass, aluminum, alloys, ceramics, synthetic resin, etc. The above-described land/groove pattern is formed by a stamper generation method, etc. The formation of the magnetic layer on the land/groove pattern is performed by a vacuum film forming method (such as vacuum evaporation, sputtering, ion plating, etc.), a plating method, etc. In both cases of planar recording and perpendicular recording, master carriers to be used for master carriers 3, 4 are approximately the same.

[0041]

In the case of planar recording, a magnetic field application device (not shown), for applying a transfer field and an initializing field, as necessary, is constructed of ring-type head electromagnets, which have a coil wound on a core having a radial gap in the radial direction of the slave medium 2 and are arranged on both sides of the holder 10. The electromagnets arranged on both sides apply transfer fields in the same direction parallel to the data track direction, respectively. By rotating the holder 10, the transfer fields are applied to the entire surfaces of the slave medium 2 and the master carriers 3, 4. Instead of rotating the holder 10,

the magnetic field application device may be rotated with respect to the holder 10. The magnetic field application device may be arranged only on one side. There may be provided one or two permanent magnet devices on one side or both sides. Also, a magnetic field application device in the case of perpendicular recording is constructed of electromagnets or permanent magnets, which are arranged on both sides of the holder 10 and differ in polarity. The magnetic field application device generates a transfer field in a direction perpendicular to the holder 10 and applies it to the slave medium 2 and the master carriers 3, 4. In the case where a magnetic field is applied to a portion of the holder 10, the magnetic transfer to the entire surface is performed by moving either the holder 10 or the magnetic field.

[0042]

Next, a description will be given of the magnetic transfer process. In the above-described holder 10, magnetic transfer is performed on a plurality of slave media 2 by the same master carriers 3, 4. Initially, the master carriers 3, 4 are positioned with respect to the left-side holder portion 5 and right-side holder portion 6 and are held by the holder portions 5, 6.

[0043]

With the left-side holder portion 5 and the right-side holder portion 6 spaced, the slave medium 2 previously magnetized in the planar direction or perpendicular direction is positioned so that the center thereof is aligned with those of the master carriers 3, 4. Next, the right-side holder portion 6 is moved toward the left-side holder portion 5.

[0044]

After the interior space of the holder 10 is closed, the interior space is decompressed by pumping air out of the space with the vacuum suction means, and the interior is reduced to a predetermined degree of vacuum. If the right-side holder portion 6 is further moved toward the left-side holder portion 5, the master carrier 4 is brought into contact with the slave medium 2. With pressure due to an external force (atmospheric pressure) proportional to the degree of vacuum, parallel intimate-contact forces are exerted uniformly on the slave medium 2 and master carriers 3, 4 toward the left-side holder portion 5 through the elastic member 8, whereby they are brought into intimate contact with one another at a predetermined contact pressure.

[0045]

Thereafter, the magnetic field application device is moved toward both sides of the holder 10. The magnetic field

application device applies transfer fields in the direction opposite to the direction of the initializing field, while rotating the holder 10. In this manner, magnetization patterns corresponding to the transfer patterns on the master carriers 3 are transferred and recorded on the magnetic recording portions of both sides of the slave medium 2, respectively.

[0046]

Each of the transfer fields applied during magnetic transfer is passed through the land pattern portion of the land/groove pattern (transfer pattern) of each master carrier 3, 4 that is in intimate contact with the slave medium 2. In the case of planar recording, the initial magnetization in the land pattern portion of the land/groove pattern is not reversed, but the initial magnetization in the groove pattern portion is reversed. In the case of perpendicular recording, the initial magnetization in the land pattern portion is reversed, but the initial magnetization in the groove pattern portion is not reversed. As a result, magnetization patterns corresponding to the transfer patterns on the master carriers 3, 4 are transferred and recorded on both sides of the slave medium 2.

[0047]

According to the first embodiment, in bringing the master carriers 3, 4 into intimate contact with both sides of the slave

medium 2, the right-side master carrier 4 is uniformly pressed through the elastic member 8 with an intimate-contact force created when the deformation quantity of the elastic member 8 is 5 to 500 μm. With the deformation of the elastic member 8, the contact surfaces between the slave medium 2 and the master carriers 3, 4 can be aligned with each other, and the slave medium 2 and the master carriers 3, 4 can be intimately contacted uniformly over the entire surfaces thereof without forming any gap therebetween. Therefore, magnetization patterns corresponding accurately to the transfer patterns formed in the master carriers 3, 4 can be transferred and recorded on both sides of the slave medium 2. In addition, there is no excessive deformation in the elastic member 8 and therefore the shift of the master carrier 4 in the planar direction is small. Thus, since the positional shift of a transferred signal is within an allowable core shift quantity, better transfer quality due to uniform contact can be obtained and magnetic transfer with high reliability can be performed. Furthermore, even when positioning members are used, the deformation quantity of the elastic member 8 is small and therefore the quantity of the master carrier 4 to be moved in a direction where pressure is applied is small. Thus, the occurrence of dust particles and reduction in the durability due to the rubbing of the

positioning members can be suppressed.

[0048]

Referring to Fig. 2, there is a cross sectional view showing an open state of a holder 20 constructed in accordance with a second embodiment of the present invention. In this embodiment, magnetic transfer is serially performed with a master carrier 3 contacted intimately to one side of a slave medium 2.

[0049]

The holder 20 of the second embodiment is equipped with a left-side holder portion 15 and a right-side holder portion 16 which are movable toward and away from each other. Within an interior space that is hermetically sealed by a seal cover 7 at the outer periphery when the left-side and right-side holder portions 15, 16 are moved toward each other, the slave medium 2 and master carrier 3 are arranged, and with the centers aligned with each other, the slave medium 2 and master carrier 3 are held in intimate contact with each other.

[0050]

As with the left-side holder portion 5 of the first embodiment, the interior pressing surface (reference surface) 15a of the left-side holder portion 15 holds both the master carrier 3, which transfers information such as servo signals

to one side of the slave medium 2, and the slave medium 2. On the other hand, the interior pressing surface 16a of the right-side holder portion 16 is provided with an elastic member 18, which is in the form of a sheet and constructed of an elastic material. The other side of the slave medium 2 is pressed against the elastic member 18.

[0051]

The left-side holder portion 15 is in the form of a disc, and the central portion of the circular interior pressing surface 15a, which is greater than the outside diameter of the left-side master carrier 3, has suction apertures 15b in a range corresponding to the size of the left-side master carrier 3. The suction apertures 15b communicate with an air passageway 15c, which is formed within the left-side holder portion 15. The air passageway 15c is connected to a vacuum pump (not shown) provided outside the holder portion through a support shaft 15d so that the left surface of the left-side master carrier 3 can be held by suction through the introduction of suction pressure.

[0052]

On the other hand, the right-side holder portion 16 is also in the form of a disc, and the interior pressing surface 16a greater than the outside diameter of the slave medium 2 has a recess, which has a depth equal to the thickness of the elastic

member 18. The recess is provided with suction apertures 16b. The suction apertures 16b communicate with an air passageway 16c, which is formed within the right-side holder portion 16. The air passageway 16c is connected to a vacuum pump (not shown) provided outside the holder portion through a support shaft 16d. Since the elastic member 18 has no suction apertures, it is suction held to the interior surface 16a by vacuum pressure introduced in air passageway 16c. Note that instead of being suction held, the elastic member 18 may be firmly attached to the interior surface 16a by an adhesive when the elastic member 18 is attached to the right-side holder portion 16.

[0053]

The seal cover 7 installed on the outer periphery of the right-side holder portion 16 is the same as that of the above mentioned embodiment, and is mounted on a flange 16e protruding from the outer peripheral surface of the right-side holder portion 16. The end surface of the seal cover 7 is equipped with an end-surface seal member 7b, which is pressed against the interior surface 15a of the left-side holder portion 15 to seal and a peripheral-surface seal member 7c, which is pressed against the outer peripheral surface of the right-side holder portion 16 to seal the interior space in a sliding manner.

[0054]

The left-side support shaft 15d and right-side support shaft 16d protrude from the centers of the back surfaces of the left-side holder portion 15 and right-side holder portion 16 and are supported by the main body (not shown) of the magnetic transfer device. The left-side holder portion 15 and right-side holder portion 16 are connected to a drive mechanism (not shown) so that they are rotated at the time of magnetic transfer.

[0055]

At least one of the holder portions 15, 16 is movable so they can move toward and away from each other. For example, if the holder portions 15, 16 are moved from the position shown in Fig. 2 to a position where they are held in intimate contact with each other, the interior space is hermetically sealed. After it is hermetically sealed, the interior space is decompressed by the vacuum suction means, and this deforms the elastic member 18 and brings the master carrier 3 into intimate contact with one side of the slave medium 2 at a predetermined pressure.

[0056]

The material, thickness, etc., of the elastic member 18 are determined so that when pressure is applied, the deformation quantity of the elastic member 18 in the pressure-applied

direction is in a range of 5 to 500 μm. This elastic member 18 is the same as that of the aforementioned embodiment.

[0057]

Note that in addition to the elastic member 18 provided in the right-side holder portion 16, another elastic member may be provided in the interior surface 15a of the left-side holder portion 15. As described above, it is preferable that the interior surface 15a of the left-side holder portion 15 serves as a reference surface, and the elastic member 18 is provided in the interior pressing surface 16a of the right-side holder portion 16 which presses the master carrier 3 and the slave medium 2 toward the reference surface.

[0058]

The remaining construction is the same as the first embodiment. In the holder 20, magnetic transfer is performed on a plurality of slave media 2 through the same master carrier 3. The master carrier 3 is first positioned with respect to the left-side holder portion 15 and is held by the holder portion 15. Then, with the left-side holder portion 15 and the right-side holder portion 16 spaced, the slave medium 2 previously initially magnetized in the planar direction or perpendicular direction is positioned so that the center is aligned with that of the master carrier 3. Next, the right-side

holder portion 16 is moved toward the left-side holder portion 15.

[0059]

After the interior space of the holder 10 is closed, the interior space is decompressed by pumping air out of the space with the vacuum suction means, and the interior is reduced to a predetermined degree of vacuum. If the right-side holder portion 16 is further moved toward the left-side holder portion 15, the elastic member 18 is brought into contact with the slave medium 2. With pressure due to an external force (atmospheric pressure) proportional to the degree of vacuum, parallel intimate-contact forces are exerted uniformly on the slave medium 2 and master carrier 3 toward the left-side holder portion 15 through the elastic member 18, whereby they are brought into intimate contact with one another at a predetermined contact pressure. Thereafter, the magnetic field application device performs magnetic transfer by applying a transfer field in a direction opposite to the direction of the initial magnetization.

[0060]

According to the second embodiment, when the elastic member 18 is brought into intimate contact with the slave medium 2, the deformation quantity of the elastic member 18 is 5 to

500 μm. Therefore, the elastic characteristics required for uniform contact are obtained. In addition, the positional shift in the planar direction of the slave medium 2 due to excessive deformation of the elastic member 18 is small. Since the positional shift of transferred signals is within an allowable core shift quantity, better transfer quality due to uniform contact is obtained and magnetic transfer with high reliability is performed.

[Brief Description of the Drawings]

FIG. 1 is a schematic sectional view showing the open state of a holder for a magnetic transfer device constructed in accordance with a first embodiment of the present invention;

FIG. 2 is a schematic sectional view showing the open state of a holder for a magnetic transfer device constructed in accordance with a second embodiment of the present invention.

[Explanation of the Reference Numerals]

10, 20	holder
2	slave medium
3, 4	master carrier
5, 15	left-side holder portion
5a, 15a	interior pressing surface

6, 16	right-side holder portion
6a, 16a	interior pressing surface
7	seal cover
8, 18	elastic member
8a	suction aperture

FIG.1

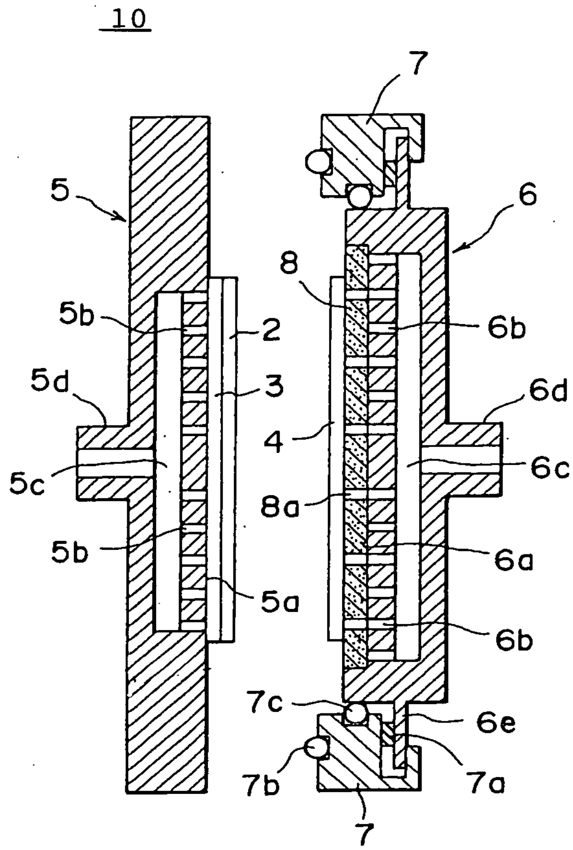
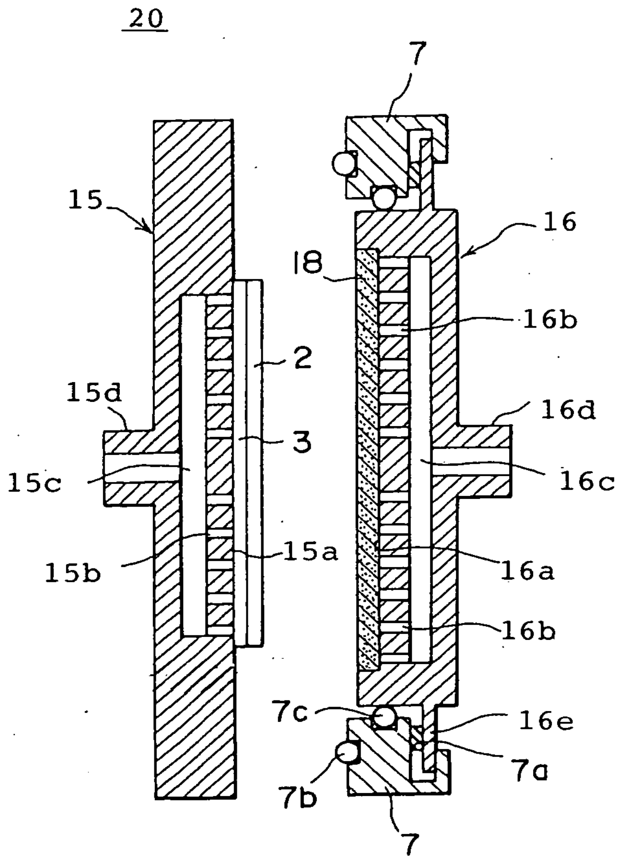


FIG.2



[Name of Document] Specification

[Abstract]

[Objective]

To provide a holder for a magnetic transfer device which is capable of enhancing intimate contact between a master carrier and a slave medium through an elastic member and enhancing the quality of transferred signals, while preventing positional shift and the occurrence of dust particles, and enhancing the durability of the master carrier.

[Constitution]

A holder 10 for a magnetic transfer device comprises a first holder portion 5 and a second holder portion 6 which are movable toward and away from each other. Between the two holder portions, there is formed an interior space where master carriers 3, 4 with information are held in intimate contact with a slave medium 2 to which the information borne by the master carrier is transferred. At least one of the first holder portion 5 and second holder portion 6 has an interior pressing surface provided with an elastic member 8 having elastic characteristics. The elastic member 8 has a deformation quantity of 5 to 500 μm in a pressure-applied direction when pressure is applied.

[Selected Figure] Figure 1